AN INTERIM ACCOUNT OF THE MIDDLE DEVONIAN TIMOR LIMESTONE OF NORTH-EASTERN NEW SOUTH WALES

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(Plates xiv–xxiv and Text-figures 1–15)

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Synopsis

The outcrop of the Timor Limestone is between six and seven miles long and up to two miles wide. It is controlled by the Timor Anticlinorium and consequently has the same north-north-west south-south-east trend.

The account is based primarily on seven surface sections. A type section, 1150 feet thick, is chosen. North-westwards from the type section the limestone thins to zero over a distance of just less than four miles; depositional limits in other directions are not exposed.

Preliminary petrographic studies of specimens from the type section indicate that the limestone varies essentially from a coarse, locally argillaceous, calcilutite with abundant biogenic debris in the lower part, to an intraclastic biogenic calcarenite with a medium to very coarsely crystalline sparry calcite cement in the upper part. Microstylolites with iron stained argillaceous concentrations along their sutures are ubiquitous in the lower beds of the type section and in places are developed to such an extent that the rock appears brecciated. Two distinct groups of cherty units are present. Detrital quartz is a significant clastic contributor in the upper half of the section.

Initial faunal studies have led to the recognition of four conodont and four tetracoral assemblages. In ascending order these are the *Icriodus corniger*, *Polygnathus kockelianus australis*, *P. kockelianus-robusticostatus* and *P. varcus* conodont assemblages and the *Stringophyllum*, *Xystriphyllum* (?) *giganteum*, *Grypophyllum* cf. *denckmanni* and *Stringophyllum* cf. *isactis* tetracoral assemblages. All faunas are of Middle Devonian age, but one of the most important results is that several conodonts have demonstrably longer ranges in Australia than has previously been ascribed to them in Europe. This introduces some difficulty into establishing precise correlations of the Timor Limestone. Approximately, we believe that the *corniger*, *australis* and *varcus* assemblages correspond to the German *corniger*, *bidentatus* and *varcus* Zones respectively and that the *kockelianus-robusticostatus* assemblage is equivalent to the combined *kockelianus*, *eiflius* and *robusticostatus* Zones of Germany. There is no evidence of the presence of the German *hermanni-cristatus* Zone, it is therefore concluded that full sections of the Timor Limestone range from early Eifelian to late, but not latest, Givetian. The north-west extending tongue of the limestone is late Givetian.

Most of the important conodonts and tetracorals are figured. *Polygnathus kockelianus australis* is proposed as a new subspecies of conodont. Two new genera, *Amaraphyllum* and *Blysmatophyllum*, and three new species of tetracorals, *A. amoenum*, *B. isisense* and *Sanidophyllum etheridgei* are erected. The term sanidophylloid is introduced for a distinctive form of corallum for which there is no name in existing glossaries.

I. Introduction

The Timor Limestone which is situated approximately 16 miles north-east of Murrurundi (Text-fig. 1) is the thickest of the known limestone members of the Yarrimie Formation of north-eastern New South Wales.

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Preliminary studies of its rich conodont and coral faunas indicate that where it is fully developed it may span all Eifelian and most Givetian time and that it certainly embraces the interstage boundary. From a biostratigraphical standpoint therefore, it is one of the most important Devonian carbonates in eastern Australia. It is also likely to be important as a source of data concerning the origin and diagenesis of limestones within sequences exhibiting many of the features characteristic of turbidite sedimentation. Hitherto it has been described only superficially and in some respects inaccurately. It is hoped that the present work will go some way towards remedying this and that it will serve as a springboard for subsequent studies.

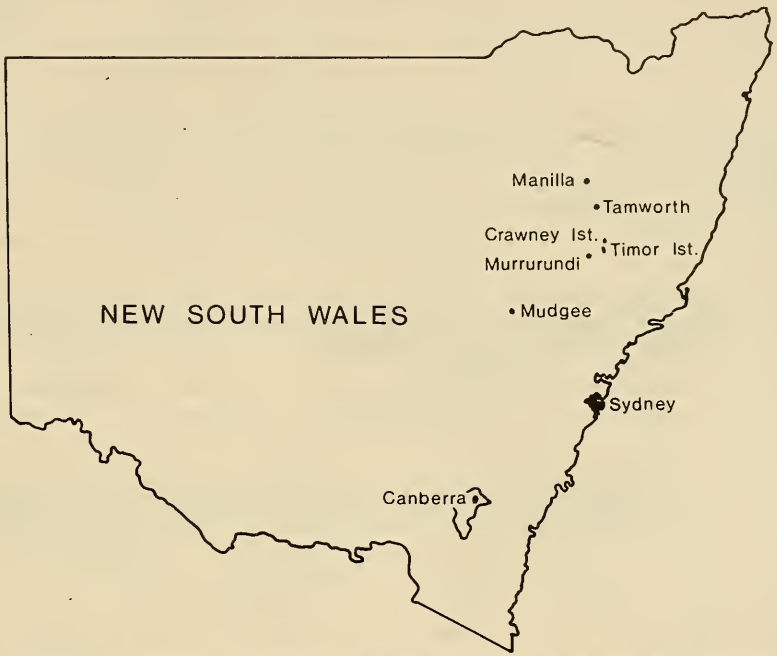

Fig. 1. Map of New South Wales showing the location of the Timor and Crawney Limestone outcrops. Other Middle Devonian limestones occur near Mudgee (Mount Frome Limestone) and between Tamworth and Manilla (Sulcor, which is mostly Emsian, and Moore Creek Limestones).

II. Previous Work

The Timor Limestone was evidently known to several geologists and collectors (Etheridge, 1898, 1902; Dun, 1901; Benson, 1913, 1918) prior to the publication of the work in which it was first named, described and analysed (Carne and Jones, 1919). Its outcrop was originally mapped by Osborne *et al.* (1950, Pl. 22) in a paper dealing with the structure and stratigraphy of the upper Isis River area, and was again discussed by Osborne (1950, pp. 49–52) in a broader work on the Hunter-Manning-Myall region. A sketch map of the limestone has also been given by Crook (1961, sheet 4). The most detailed map yet published is that of Manser (1968).

Fossils listed by Dun (1901) from the Parish of Crawney, County of Brisbane, constitute the first published faunal list from the Timor Limestone. Later lists given by Benson (1913, pp. 498, 499; 1918, p. 595; 1922) include forms from both the Timor and Crawney Limestones of present usage. This unfortunate confusion stemmed partly from Benson's mistaken belief that

the two limestones are continuous beneath the Tertiary basalts of the Liverpool Range and partly from the fact that there are two parishes named Crawney in the area, in which similar, but nevertheless distinct, Devonian limestones outcrop. One of these parishes lies to the north of the Liverpool Range in the County of Parry; the only limestone exposed in it is the Crawney Limestone. The other is south of the range in the County of Brisbane; in it the limestone exposed is the Timor Limestone of current usage. The *Tryplasma* listed by Etheridge (1907, p. 102) from the County of Brisbane and the *Heliolites porosus* (Goldfuss) identified by Jones and Hill (1940, p. 204) from the Isis River are presumably Timor Limestone fossils.

In addition to these listed fossils five Timor species have been described and figured, *viz*: the corals *"Endophyllum" schlueteri* (Etheridge, 1898; David and Browne, 1950, Pl. 25, Figs *b, c*), *Bensonastraea praetor* Pedder (1966, pp. 185, 186) and *"Cystiphyllum* (? *Microplasma*) *australaisica"* Etheridge (1902, pp. 256–258, Pl. 40 Fig. 4), and the gastropods *Burdekinia axionoides* (Etheridge, 1921, pp. 1, 2) and *Euomphalus isisensis* (Etheridge, 1921, p. 2; Knight, 1941, pp. 34, 35), which is the type species of *Amphelissa*.

Summaries of the most recent biostratigraphic work on the limestone have been given by Philip and Pedder (1967, pp. 236, 237; 1968, p. 1034) and Pedder (1968, pp. 139, 140). These publications pointed out that the Timor Limestone attains a greater thickness than was formerly realised and that it is quite discrete from the Crawney Limestone. They also showed that it includes older and younger beds than the Moore Creek or Crawney Limestones with which it had previously been correlated.

Besides proposing three members within the Timor Limestone, Manser (1968) has erected a new formational name (Busches) for the strata overlying it and another (Lilberne) for the beds that underlie it. But as the Busches and Lilberne Formations are similar—a point Manser himself makes—and are almost certainly continuous beneath the basalts of the Liverpool Range with the well known Yarrimie Formation to the north, and as the Timor Limestone is lensoidal, we believe that the Busches and Lilberne Units are better referred to the Yarrimie Formation and that the Timor Limestone should be regarded as a member of the same formation. Manser's Timor Limestone members are essentially based on cherty horizons within the limestone. Our work indicates that these are not as continuous as Manser's publication indicates, therefore we feel that there is no need at this time to formally recognise further divisions within the Timor Limestone Member.

III. General Geology of the Timor Limestone

Structure and outcrop: The Timor Limestone is exposed on both flanks of a north-north-west south-south-east trending anticlinorium named the Timor Anticline by Osborne *et al.* (1950). Its outcrop is between six and seven miles long and at the widest point, between Isaacs and Perrys Creeks (Text-fig. 2 and Pl. A), is approximately two miles across. West of the Isis River, between "North Glen Dhu" Homestead and Isaacs Creek, the limestone maintains a dip of about 25° to the south-west. Southwards this mass passes beneath alluvium. Northwards it thins and finally lenses out just north of "Minto" Homestead, but is dissected in the vicinity of "North Glen Dhu" Homestead by an intricate fault system called the "Glen Dhu Complex" by Osborne (1950). East of the Isis River the limestone is complexly folded and the north-eastern part of its outcrop is fault-bounded. To the south-east it dips at 15° to 18° and disappears beneath overlying beds of the Yarrimie Formation.

Complete sections of the limestone (e.g. sections 7, 2, 3 and 4) can be measured at a number of points north of "Allston" Homestead, but to the south of it (e.g. section 1 and Crook's "representative section") alluvium invariably obscures the lowermost beds. Because of structural complexity good sections are fewer to the east of the Isis River, only two have been measured (sections 5 and 6) of which only one (section 6) exposes the entire limestone.

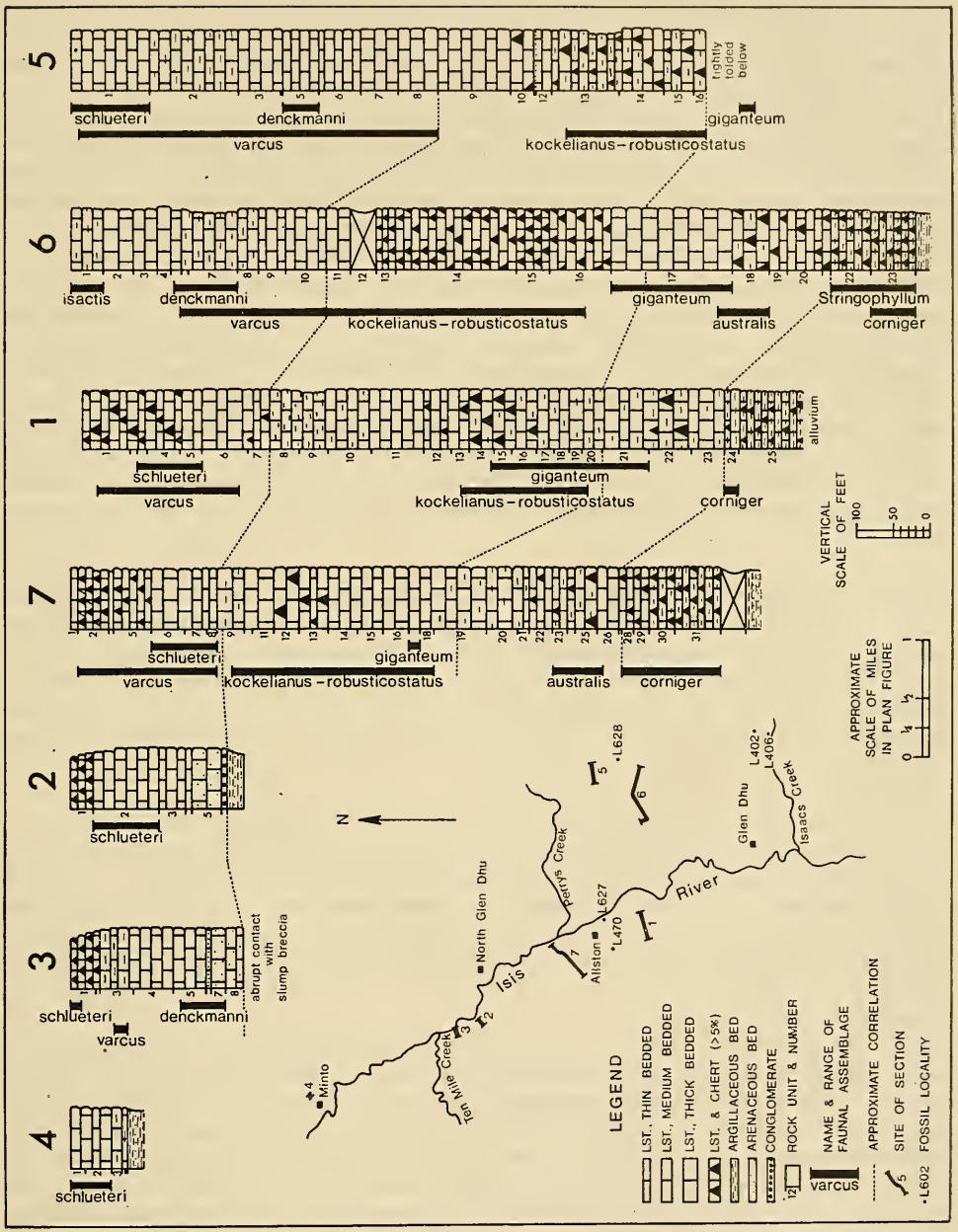

Fig. 2. Distribution of faunal assemblages in measured sections of the Timor Limestone with implied correlations. Plan inset shows fossil and measured section localities relative to main streams and homesteads.

Stratigraphy: The greatest obtainable stratigraphic thickness of limestone is 1150 feet in section 6 (Text-fig. 2). As this section is on the eastern flank of the anticlinorium there is no information regarding the thickness of the limestone further to the east; nor, because of folding and alluvial cover, is there much indication of its thickness to the south. There are however clear indications that it thins in places markedly, to the west, north-west and north.

At section 1, which is about one mile west of section 6, the limestone is 982 feet thick and although the base is not exposed, it is probably very nearly a complete section (unless limestone sedimentation began here earlier than elsewhere) since *Icriodus corniger* occurs almost 100 feet above the exposed base. At Section 7, which is three quarters of a mile north-west of section 1, there are between 890 and 921 feet of Timor Limestone. In less than one mile north-west of section 7, at section 2, the total thickness of the limestone diminishes to 212 feet and at section 4, one and three quarter miles further north-west again, it is only 77 feet. The limestone finally lenses out just under one half mile north of "Minto" Homestead.

Although in general contacts between the Timor Limestone and adjacent sediments are poorly exposed, there is no evidence of unconformity at either the top or the base of the limestone. Locally, as in sections 2 and 3, a basal conglomeratic unit disconformably overlies finely laminated siltstones of the Yarrimie Formation and at section 4 there is an abrupt contact with large elongate stromatoporoid coenostia resting directly on Yarrimie argillite; however in other localities where it is exposed, the contact is gradational in thin alternating beds of dark grey limestone and fine arenites and mudstones. The upper contact is similarly transitional in some places, and abrupt in others.

Since a type section has not been proposed previously we now designate section 6 of this work (Text-fig. 2, Pl. A) as the type Timor Limestone section. It is the thickest of the measurable sections and has reasonably well exposed upper and lower contacts. Beds within it are well exposed and can be traced laterally for some distance, furthermore they show variations of lithology that are almost as great as the total variation of the limestone and all eight of the conodont and tetracoral assemblages recognized in the Timor Limestone are well represented in it.

IV. Microscopic Petrography of the Type Timor Limestone Section

This preliminary description (by D.W.E.) is based on randomly orientated thin sections and supplementary acetate peels of 53 specimens from section 6 (type section). The terminology and grain size scale for the carbonate fragments employed here are essentially those of Folk (1959), with clastic particles classed according to the Wentworth (1922) grade scale. Descriptive phrases are used in preference to Folk's (1959, p. 17) composite-word nomenclature.

Units 23–20 (975·6′–1150·0′ from top): Coarse calcilutite to fine calcarenite with up to 25% medium to coarse sand size organic debris. Iron-stained argillaceous material is concentrated along the sutures of numerous microstylolites. Argillaceous microlaminae are moderately common. Disseminated silica is particularly profuse in unit 23 and the lower part of 22. Organic debris consists primarily of whole and broken crinoid plates and ossicles, ostracods, silicified corals and algal (?) strands lying parallel to the bedding planes; calcispheres occur in some sections. Intraclasts are common only near the top of unit 20. Pyrite is present principally as local concentrations along the questionable algal strands in the middle of unit 22.

Units 19–18 (899·8′–975·6′ from top): Biogenic, fine to medium calcarenite, consisting chiefly of broken and abraded crinoid debris cemented by a medium crystalline sparry calcite. Subrounded to subangular fine sand size detrital quartz and iron stained argillaceous material are concentrated along microstylolites. Minor amounts of disseminated silica are also present. Syntaxial overgrowths commonly obscure the original shape of the crinoid fragments and much void-filling spar occurs throughout these units.

Unit 17 (735·7′–899·8′ from top): Coarse calcilutite to fine calcarenite with a 10% to 20% coarse sand size or larger organic debris content. Minor amounts of subangular, fine sand size, detrital quartz grains occur near the top of the unit. Small, clear, variable patches of medium to coarsely crystalline sparry calcite are present. Well rounded, spheroidal intraclasts of dark grey crypto- to microcrystalline calcite ooze, mostly 0·13 to 0·20 mm. in diameter, constitute a major fragmental type. Organic debris includes broken and abraded crinoid fragments, commonly with optically continuous calcite overgrowths, and minor amounts of stromatoporoidal, coralline and algal material. Faecal pellets are also present.

Units 16–13 (416·2′–735·7′ from top): Very fine calcarenite with some interspersed fine sand size skeletal debris. The matrix consists of a dark brown to grey, finely crystalline calcite ooze, stained by organic matter and inclusions of ferruginous clay particles which usually occur as streaks. Recognizable organic debris is absent or rare in the lower units, but higher in units 14 and 13 broken and corroded crinoid fragments, entire ostracods, gastropods and especially algal fragments are abundant. Calcispheres and abraded brachiopod fragments are also present although they are not common. Pellets and coarse silt size intraclasts are scattered throughout, but are most prevalent in unit 16.

Units 11–9 (254·3′–380·2′ from top): Intraclastic, biogenic calcarenite with a clear medium crystalline sparry calcite cement. Well rounded elongate intraclasts with an average diameter of 0·20 mm. constitute about 35% of the rock volume. Up to 30% of the remainder comprises crinoid stems, coralline and stromatoporoidal fragments and questionable algal balls. Subangular, coarse silt size detrital quartz grains are a very minor constituent of this interval.

Units 8–4 (117·0′–254·3′ from top): Intraclastic calcarenite with a medium crystalline sparry calcite cement. A distinct brownish cast which pervades the groundmass appears to be due to concentrations of argillaceous and organic detritus associated with intraclasts are crinoid fragments which diameter 0·50 mm.) of microcrystalline calcite, some showing recrystallization textures, dominate the allochemical constituents of the interval. Fossil fragments, principally crinoid ossicles, are rare. Subangular, very fine sand size detrital quartz occurs throughout. The top of the unit 7 is relatively rich in pyrite.

Units 3–2 (43·4′–117·0′ from top): Intraclastic calcarenite with a medium to very coarsely crystalline sparry calcite cement. Well rounded intraclasts of extremely variable size and shape constitute up to 70% of the total rock. Mostly they seem to consist of silt size carbonate particles, but some contain crinoid and algal fragments and also detrital quartz. The most important organic detritus associated with the intraclasts are crinoid fragments which have been severely abraded and in places show signs of corrosion; many are optically continuous with the sparry calcite cement. Subrounded, fine to medium sand size detrital quartz fragments are liberally scattered throughout the interval. Very minor amounts of pyrite and haematite coat the surface of some intraclasts.

Unit 1 (uppermost 43·4'): Biogenic, pelletoidal calcarenite with a fine to medium crystalline sparry calcite cement. Fine sand size organic debris of crinoidal, coralline, ostracodal and algal (?) fragments, together with some calcispheres constitute up to 50% of the rock. Dark brown to opaque, spheroidal to oblate pellets of microcrystalline calcite make up 25% of the remainder. A brownish cast in the sparry calcite of the cement is apparently due to organic or argillaceous inclusions. Angular, silt size, detrital quartz is present in minor quantities.

V. Faunas and Age of the Timor Limestone

Four megafossil assemblages, believed to range in age from early Eifelian to late Givetian, have previously been recognized in the Timor Limestone (Pedder, 1968, pp. 139, 140; Philip and Pedder, 1967, pp. 236, 237). Further field and laboratory studies now allow one of us (J.H.J.) to suggest a provisional scheme of microfossil zonation. Known occurrences of mega- and microfossil assemblages in measured sections are indicated in Text-fig. 2; their approximate relationships and correlation with Wittekindt's (1966) German conodont zones are expressed in Text-fig. 3.

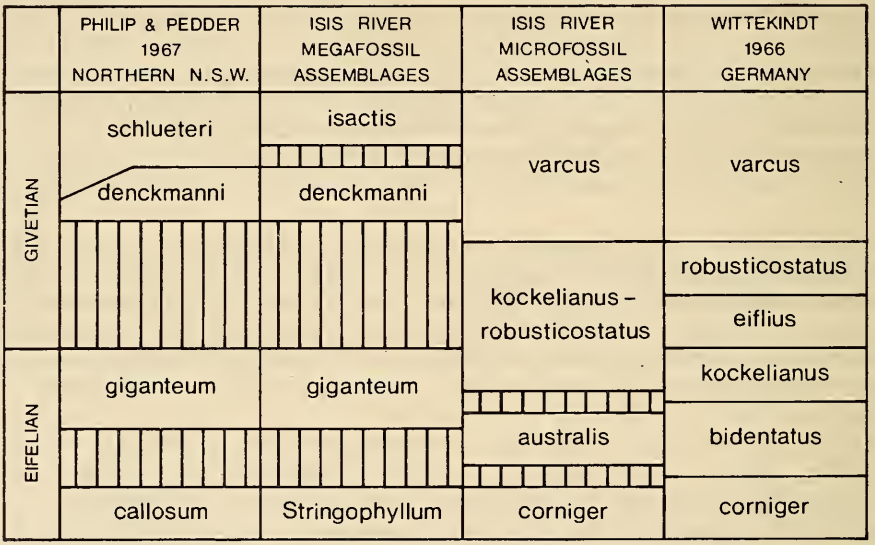

Fig. 3. Table indicating the approximate relationships of the mega- and microfossil assemblages of the Timor Limestone and conodont zones currently recognized in Germany.

Icriodus corniger and *Stringophyllum** assemblages.—*Icriodus corniger* occurs at or near the base of the limestone in sections 1, 6 and 7. In section 6 it is accompanied by *Polygnathus linguiformis linguiformis* and *P. webbi*. This assemblage is known overseas in the late Emsian Heisdorfer Schichten of the Eifel, the early Eifelian Ballersbacher Kalk of the Rhenish Massif, the upper three members of the Onondaga Limestone of New York (Klapper and Ziegler, 1967, p. 78) and in the Jeffersonville Limestone of Indiana (Orr *in* Collinson *et al.*, 1968, p. 955). *I. corniger* itself occurs with *Paraspirifer cultrijugatus* in the upper beds of the Santa Lucía Limestone of northern Spain, where it is considered to be of early Eifelian age (Van Adrichem

* A new large (maximum diameter 55 mm.) solitary species with up to 64 major septa.

Boogaert, 1967, enclosure 1; Brouwer, 1968, p. 41), but in Indiana it is reported to range as high as the North Vernon Limestone of probable Givetian age (Orr, *op. cit.*, p. 955). The Timor assemblages are believed to be early Eifelian as at the moment in Australia *Stringophyllum* and *Calceola sandalina* (*s.s.*) are presently unknown in definitely pre-Eifelian beds. Moreover they underlie the *Xystriphyllum* (?) *giganteum* megafauna, which on independent grounds is believed to be late Eifelian.

Polygnathus kockelianus australis assemblage: This includes *Polygnathus kockelianus australis* subsp. nov., *P. angustipennatus; P. pseudofoliatus, P. robusticostatus* (*s.l.*) and a few *Spathognathodus bidentatus bidentatus* and *S. b. transitans*. Although in the Belgium succession (Bultynck 1966; 1968, p. 427) *S. b. transitans* is not known before Co_2 and *S. obliquus* has not been identified at Timor, this assemblage appears to be an approximate correlative of Wittekindt's *bidentatus* Zone, that is the lower Günteröder Kalk of Germany. The assemblage index is presently known only from the Timor Limestone.

Xystriphyllum (?) *giganteum* assemblage: Among others this comprises *Dendrostella* sp. cf. *D. rhenana* of Hill, 1942*b*, *Xystriphyllum* (?) *giganteum*, *X.* sp. nov., *Sociophyllum densum, Sanidophyllum davidi, S. colligatum* and probably *Bornhardtina coulteri,* all of which are also known in the Moore Creek Limestone. The Moore Creek megafauna is not easily correlated with overseas faunas, but *X.* (?) *giganteum, "Campophyllum"* sp. cf. *"C." lindstroemi* and *Mesophyllum cornubovis* closely resemble *"Spongophyllum" varians* (see Birenheide, 1962, pp. 80, 81), *"Cyathophyllum" lindstroemi* (Frech, 1886, p. 183 (69)) and *M. cristatum* (see Birenheide, 1964, pp. 41, 42), which in Germany overlap in beds of late Eifelian age.

Polygnathus kockelianus—P. robusticostatus assemblage: The assemblage is heralded by the incoming of *P. kockelianus kockelianus* and *P. trigonicus*, which are also known to occur together in the latest Eifelian (Wittekindt, 1966) Kalkgie Zwischenschichten (Bischoff and Ziegler, 1957) of Germany and in strata regarded as Co_{2c} at the southern end of the Dinant Basin (Bultynck, 1966, pp. 195, 197). In the Timor sequence however, these, together with *P. eiflius* and *P. robusticostatus* (*s.l.*), almost range up to the entry of *P. varcus*. Thus it appears that this assemblage approximates to the combined *kockelianus, eiflius* and *robusticostatus* Zones of Wittekindt and that the Eifelian/Givetian boundary falls within it.

Polygnathus varcus assemblage: *Polygnathus varcus, Spathognathodus brevis* and other longer ranging conodonts characterize this assemblage. Abroad, *P. varcus* is recorded from the late Givetian of Germany (Bischoff and Ziegler, 1957, pp. 98, 99; Bartenstein and Bischoff, 1962, p. 50; Wittekindt, 1966, p. 627), the Kanzel-Kalk of Austria (Flajs, 1966, Pl. 25, Fig. 6), the basal Portilla, upper Gustalapiedra and lower Gardaño Formations of northern Spain (Van Adrichem Boogaert, 1967, enclosures 1, 3, 4) and the Tichenor, Kashong, Tully, Silica, Lingle, North Vernon and Cedar Valley (Solon Member) Formations of North America (Klapper and Ziegler, 1967, pp. 79, 80; Orr, *op cit.*, pp. 955, 956). The base of the Givetian is not yet established with certainty in North American sequences, but of these occurrences, all the European and at least several of the North American are middle to late Givetian in age. The appearance of *Ancyrognathus walliseri* in unit 5 of section 7 is interesting in that it may indicate correlation with the *walliseri* horizon of the middle *varcus* Zone (Wittekindt, 1966, pp. 628, 629). The presence of forms approaching *Polygnathus linguiformis transversus* and the absence of any evidence of the *hermanni-cristatus* Zone in the topmost Timor Limestone, suggest that it is of late, but not latest Givetian age.

Grypophyllum cf. *G. denckmanni* assemblage: This is best developed along the north-eastern flank of the Timor Anticlinorium, where it includes *Heliolites* sp., cf. *Placophyllum* sp., *Grypophyllum* sp. cf. *G. denckmanni*, *Dohmophyllum* sp., *Stringophyllum quasinormale* var., *S.* sp. nov., *Sociophyllum* sp. nov., *Amaraphyllum amoenum* gen. et sp. nov., cf. *Sinospongophyllum* sp. nov., *Endophyllum* sp., *Sanidophyllum etheridgei* sp. nov., *Blysmatophyllum isisense* gen. et sp. nov., *Plasmophyllum* sp., *Calceola sandalina*, together with some gastropods and brachiopods. *Grypophyllum*

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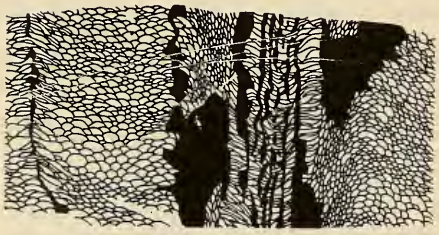

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Figs 4–9. Tetracorals of the *Stringophyllum* cf. *S. isactis* fauna of the Timor Limestone (Givetian part). All × 2. 4, 5, *Stringophyllum* sp. cf. *S. isactis* (Frech), UNE F10412, unit 1, section 6; 6, 9, "*Endophyllum*" *schlueteri* (Etheridge), UNE F8579, old collection labelled "Timor Limestone, Isis River"; 7, 8, *Taimyrophyllum* sp., UNE F10411, UNE Locality 470.

denckmanni is an early Givetian species in southern England (Engel and Schouppé, 1958, pp. 103–107; Scrutton, 1966, p. 186) and an early to late Givetian species in Germany (Engel and Schouppé, *loc. cit.*; Jux, 1964, for the age of the "Oberhonseler Schichten"). *Stringophyllum quasinormale* was originally described (Hill, 1942*a*, pp. 258–261, Pl. 10, Figs 5*a*–14*b*) from the early (?) Givetian Burdekin Downs Limestone of northern Queensland and corals akin to the form identified as cf. *Sinospongophyllum* sp. nov. are apparently abundant in the Eifelian and Givetian of Yunnan (Wang, 1948, Pl. 5, Figs 1–6; Ku 1950; Fontaine, 1966). We conclude that this fauna is Givetian and that it probably represents an early rather than late part of the stage. Much of it is endemic.

Stringophyllum cf. *S. isactis* assemblage: This corresponds closely with the *schlueteri* fauna of Philip and Pedder, 1967. In most places *"Endophyllum" schlueteri* is clearly younger than the *Grypophyllum* cf. *G. denckmanni* assemblage, but in one instance (section 7 which was measured after Philip and Pedder went to press) it first appears only 40 feet above the last occurrence of the *Polygnathus kokelianus—P. robusticostatus* assemblage, which is almost certainly within the range of *G.* cf. *denckmanni*. In view of this it is now proposed that the uppermost Timor megafauna be known as the *Stringophyllum* cf. *S. isactis* assemblage. Apart from the new index fossil the main components of this assemblage are *Taimyrophyllum* sp., *"Endophyllum" schlueteri* and *Plasmophyllum* sp. *Stringophyllum isactis* is a widely distributed Givetian species, known from Germany (Engel and Schouppé, 1958, pp. 90–93), Czechoslovakia (Kettnerová 1932, pp. 47, 48), the Russian Platform (Soshkina, 1954, p. 48), the Urals (Soshkina, 1949, pp. 136–138), Armenia (Soshkina, 1952, p. 96), Tian Shan (Frech *in* Suess, 1894, p. 442; Frech, 1897, pp. 246, 247; Brezhnev *et al.*, 1968, p. 446), Nepal (Flügel, 1966, pp. 103, 104), eastern Yunnan (Wang, 1948, p. 21) and Queensland (Hill, 1942*a*, pp. 262, 263). Timor specimens most resemble the small form figured by Frech from Tian Shan.

Systematic Palaeontology

The names of institutions responsible for the material referred to are abbreviated as follows:
AM: Australian Museum, Sydney, New South Wales.
GSNSW: Geological Survey of New South Wales, Sydney.
UNE: University of New England, Armidale, New South Wales.

The University of New England fossil localities are shown in Text-Fig. 2.
New morphological term: The term sanidophylloid is introduced for tetracoral coralla that are mostly phaceloid, but by periodic expansions of the calices are cerioid at certain levels. Sanidophylloid coralla are characteristic of the genera *Sanidophyllum, Blysmatophyllum* (see below) and *Strombodes.*

Conodonta

POLYGNATHUS KOCKELIANUS Bischoff and Ziegler, 1957. *Polygnathus kockeliana* Bischoff and Ziegler, p. 91, Pl. 2, Figs 1–12. *non,* 1957. *Polygnathus* cf. *P. kockeliana* juv. Bischoff and Ziegler, pp. 91, 92, Pl. 2, Figs 13–15 (= *Spathognathodus* sp. nov.).

POLYGNATHUS KOCKELIANUS AUSTRALIS Jackson, subsp. nov.
(Pl. B, Figs 22, 25)

Name derivation: Latin, *australis* = southern.

Type series: Holotype and paratype 1, UNE F10434, F10435 respectively, 44 feet below the top of unit 18, section 6 (993 feet below the top of the Timor

Limestone); Paratypes 2, 3, UNE F10436, F10437, top of unit 26, section 7 (745 feet below the top of the Timor Limestone). Collected by J. H. Jackson All are believed to be Eifelian.

Diagnosis: A subspecies of *Polygnathus kockelianus* in which the platform is extremely narrow, has characteristically well developed denticles extending to its posterior tip, and is bent sharply inwards. Denticles above the platform are generally broader and thicker than those on the free blade.

Description: Apart from the posterior end, which may be flexed slightly upwards, the unit is straight in lateral view. In oral view it is straight from the anterior end to a point just posterior of the basal cavity where it is deflected sharply inwards. The platform is extremely narrow; it commonly has rounded margins or edges and is generally restricted to the inner side of the unit, although a small anterior outer platform may be present. It is usually broadest above the basal cavity and tapers gradually towards its posterior extremity. There is no ornament on the platform. The blade above the platform consists of laterally compressed and fused denticles. These are outwardly directed and are usually broader and thicker posterior of the point of curvature. The free anterior blade deepens and thins anteriorly; its slender denticles are fused and have rounded tips. A slight anterior ridge extends from the platform, below the base of the denticles along the inner face. A very slight posterior ridge may also be developed on the outer lateral face. Both of the anterior lateral faces of the free blade are flat to slightly convex. On the underside of the unit a shallow basal cavity with prominent lips is situated at the anterior end of the platform. In some specimens the cavity tapers to a point at the posterior end, but in others it is shorter and is replaced posteriorly by a keel. The centre of the cavity bears a median slit which extends for a short distance along the free blade.

Remarks: Mature specimens of the new subspecies are distinguished from those of the nominate subspecies by the restricted platform and by the nature of the denticles above the platform. Juveniles of these subspecies are not easily distinguished. Thus it is difficult to assign the specimens illustrated by Bischoff and Ziegler (1957) in Figure 12 of their Plate 2, or the specimen here illustrated in Plate B, Fig. 21, to either subspecies, although they compare closely with *P. kockelianus australis* subsp. nov. *Spathognathodus bidentatus transitans* Bultynck is much less bent at the posterior end and completely lacks a platform.

Coelenterata

Family Cyathophyllidae Dana, 1846
Subfamily Disphyllinae Hill, 1939
Genus Amaraphyllum Pedder, nov.

Name derivation: Greek, αμαρα = trench, and φνλλον = leaf.

Type species: *Amaraphyllum amoenum* Pedder, sp. nov., see below.

Diagnosis: Corallum fasciculate; budding peripheral and paricidal. Septa radially arranged, either thin and smooth with parallel fibres and no discernible trabeculae, or somewhat dilated, carinate and constituted of disphyllinoid trabeculae. Dissepiments small, forming a narrow dissepimentarium. Tabularium markedly triseriate with a peripheral series of flat plates, a periaxial series of highly arched vesicles and an axial series of flat or sloping plates.

Remarks: The type and at present only species is apparently a disphyllinoid homeomorph of the Silurian genus *Entelophyllum*. It is distinguished from typical species of *Entelophyllum* (e.g. *E. articulatum* (Wahlenberg), Lang

and Smith, 1927, Figs 13, 14; Smith and Tremberth, 1929, Text-figs 1, 2, Pl. 7, Figs 1–6; *E. strictum* (M. Edwards and Haime), Stumm 1964, p. 32, Pl. 22, Figs 15–21; *E. latum* Hill, 1940, pp. 413, 414, Pl. 13, Figs 8–10) by its narrower dissepimentarium and more highly inflated periaxial tabularial elements. *E. parvum* Stumm (1962, pp. 2, 3, Pl. 2, Figs 9–11) and *E.* (?) *angulare* (Amsden, 1949, pp. 109, 110, Pl. 28, Figs 9–15) have narrow dissepimentaria but lack distinctly triseriate tabularia. Lateral processes and zigzag carinae which characterize some species of *Entelophyllum* are unknown in *Amaraphyllum amoenum*. The tabularium in many specimens of *Disphyllum* tends to be downturned near the margin and in rare cases is locally triseriate, but to my knowledge it is never consistently so as in *Amaraphyllum amoenum*. Compare for instance the figure of *Disphyllum lazutkini* (Bulvanker) given by Bulvanker (1958, Pl. 52, Fig. 1*b*) with that given by Ivaniya (1953, Pl. 5, Fig. 22; 1965, Pl. 97, Fig. 412).

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Figs 10, 11. *Amaraphyllum amoenum* Pedder, gen. et sp. nov., × 2; holotype, UNE F10390, Timor Limestone (Givetian part), unit 5, section 3.

AMARAPHYLLUM AMOENUM Pedder, gen. et sp. nov.

(Pl. D, Figs 3–7; Text-figs 10, 11)

Name derivation: Latin, *amoenus* = pleasant.

Type series: Holotype, UNE F10390, 26 feet below the top of unit 5, section 3 (202 feet below the top of the Timor Limestone). Paratypes 1–12, UNE F10391–10402, 38 to 52 feet below the top of unit 7, section 6 (196 to 210 feet below the top of the Timor Limestone). Paratypes 13, 14, UNE F10403, F 10404, 23 to 33 feet below the top of unit 7, section 6 (181 to 189 feet below the top of unit 5, section 6 (142 feet below the top of the Timor Limestone). Paratypes 16, 17, UNE F10406, F10407, 3 feet below the top of unit 5, section 6 (139 feet below the top of the Timor Limestone). Paratype 18, UNE F10408, unit 5, section 5 (287 to 334 feet below the top of the Timor Limestone). Paratypes 19, 20, UNE F10409, F10410, Timor Limestone at UNE Locality 402. Collected by A. E. H. Pedder. All are from the Givetian part of the limestone.

Diagnosis: Corallum dendroid, increase paricidal, peripheral and probably also lateral. Adult corallite diameter 8 to 14 mm. Septa smooth to very weakly carinate, radially arranged, 22 × 2 to 28 × 2 per adult corallite; major septa extend to within 1·0 to 2·5 mm. of the axis; minor septa only slightly shorter than the major. Dissepiments small, steeply inclined in 2 to 5 rows. Tabularium triseriate with a marginal series of flat tabellae, a periaxial series of highly arched tabellae and an axial series of flat to nearly flat tabulae.

Description: The corallum is fasciculate and almost invariably dendroid. Several specimens including the holotype measured more than 40 cm. across before cutting. There is definite evidence of paricidal, peripheral and less conclusive evidence of lateral increase in the type series. Adjacent corallites are generally less than 15 mm. apart and may be contiguous, although the

corallum is not known to be ever cerioid or even subcerioid. Mature corallites typically have diameters of 8·0 to 12·0 mm.; the largest known are 14·0 mm. in diameter (paratypes 1 and 2). Fine growth ridges and in places weak interseptal ridges mark the exterior of the corallites. The fine dark axial plate and lighter and much thicker fibrous layer of the wall are well preserved in much of the material; between septal bases their combined thickness is usually 0·2 to 0·3 mm., but may be as little as 0·15 or as much as 0·5 mm. The septa which are embedded in the wall are radially arranged and poorly differentiated into two orders. They may be thin and smooth and constituted of fine fibres directed inwards at 40° to 45°, or they may be thicker and lightly carinate and incorporate disphylloid trabeculae of similar inclination. In either case their point of greatest thickness is at, or very close to, the inner margin of the wall; outwards from this point, that is within the wall, they taper abruptly and do not usually touch the axial plate; inwards from this point they at first taper moderately and then, apart from any carinae, taper very gently to their axial extremity. Major septa which are only a little longer than the minor normally extend to within 1·0 to 2·5 mm. of the axis. Random septal counts at corallite diameters expressed in mm. are as follows:

19 × 2	at	6·0	paratype	19	23 × 2	at 13·0	paratype 18
19 × 2	at	7·0	paratype	19	24 × 2	at 13·8	paratype 1
21 × 2	at	9·4	paratype	16	24 × 2	at 14·0	paratype 2
22 × 2	at	7·0	holotype		26 × 2	at 9·5	paratype 20
22 × 2	at	8·6	paratype	11	26 × 2	at 12·0	holotype
22 × 2	at	11·5	paratype	19	27 × 2	at 8·4	paratype 11
23 × 2	at	9·0	holotype		27 × 2	at 11·0	paratype 20
23 × 2	at	10·0	paratype	15	27 × 2	at 12·8	paratype 20
23 × 2	at	10·3	paratype	11	28 × 2	at 12·0	paratype 20

Dissepiments are small, steeply inclined and in two to five rows. Adaxially they generally decrease in size and increase in inclination. Some carry a thin sclerenchymal investment. A few of the most peripherally situated ones cross the interseptal loculus obliquely in transverse section. The tabularium is about one half of the total width of the corallite and is distinctly triseriate. The outermost part consists of a narrow zone of predominantly flat or gently concave tabellae. Inside these the tabularium is markedly elevated and is largely composed of highly inflated vesicles. The innermost region consists of broad, flat or almost flat tabulae. Locally vesicles of the periaxial region may be continuous with either the flat outer tabellae or the inner tabulae of the dissepimentarium.

Remarks: The highly distinctive tabularium and to a lesser extent the septa distinguish this species from any other disphyllinid known to the writer. The Timor Limestone specimen catalogued as AM 49925 is probably another example of this species.

Family Endophyllidae Torley, 1933

Sanidophyllum etheridgei Pedder, sp. nov.

(Pl. F, Fig. 2; Pl. G, Fig. 3; Text-figs 12, 13)

1922. *Endophyllum* ? sp. indet.; Benson (*partim*), p. 150 (68).

Name derivation: Patronym in honour of Robert Etheridge (*fil.*), author of the genus *Sanidophyllum* and the first to describe fossils from the Timor Limestone.

Type series: Holotype and paratypes 1–6, UNE F10374–10380 respectively, unit 5, section 5 (287 to 334 feet below the top of the Timor Limestone). Paratypes 7–9, UNE F10381–F10383, 20 to 25 feet below the top of unit 7,

section 6 (178 to 183 feet below the top of the Timor Limestone). Paratype 10, UNE F10384, Timor Limestone at UNE Locality 628. Paratype 11, GSNSW F3890, labelled "Isis River". The holotype and paratypes 1–10 were collected by A. E. H. Pedder; all are from the Givetian part of the limestone. Paratype 11 was collected by G. Kershaw sometime before 16:4:1904; its matrix is identical with that of the other material and is presumably also Givetian.

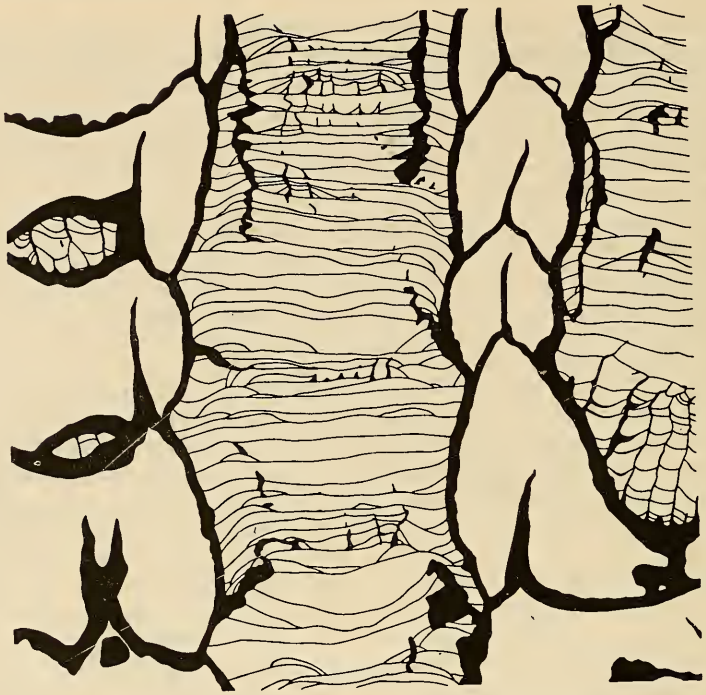
Diagnosis: Corallum sanidophylloid; corallites closely spaced, locally contiguous, 13 to 27 mm. in diameter at maturity. Calical expansions markedly upturned peripherally. Major septa 20 to 32 in number per adult corallite; minor septa very short or even entirely suppressed. Tabulae broad, commonly downturned at the periphery. Dissepiments absent.

Description: The sanidophylloid corallum is generally large and may exceed 40 cm. in diameter and 20 cm. in height. Corallites tend to be divergent initially but subsequently usually become more or less parallel; their adult diameter is typically within the range 13 to 18 mm., the largest seen attained an exceptional diameter of 27 mm. The calical expansions are generally less than 10 mm. broad and at the margin are strongly upwardly deflected forming walls that may be more than 8 mm. high. The under surfaces of the calical expansions merge gradually with the epithecas of the unexpanded parts of the corallites, moreover they are marked by similar growth annulations. The upper surface on the other hand, is quite distinct, for whereas the distal region of the calice bears short lamellae representing septa of both orders, the expanded part bears low and broad elevations corresponding to only one order of septa. New corallites first appear just inside the periphery of a calical expansion; if the expansion is broad there is no connection between the bud and the parent tabularium. Major septa normally extend approximately one half of the distance to the axis, but periodically lengthen so as to extend approximately two thirds of this distance. Minor septa are usually less than 0·5 mm. in length and may be entirely suppressed, thus there is a high degree of septal differentiation. Peripheral withdrawal of the septa is not common and where it is present is due to the insertion of a sloping marginal tabula rather than a lonsdaleoid dissepiment. Apart from minor dilations, septa of both orders are thin and smooth. Random counts of major septa at corallite diameters expressed in mm. are as follows:

1	at	4·5	holotype		21	at	15·0	paratype	10
14	at	5·0	paratype	1	22	at	16·0	holotype	
20	at	6·0	holotype		24	at	9·0	paratype	11
20	at	8·5	holotype		29	at	17·0	paratype	11
20	at	13·5	holotype		29	at	19·0	paratype	11
21	at	11·5	paratype	10	32	at	27·0	paratype	1

The tabulae are broad and characteristically downturned at the margin; adaxially sloping tabulae may supplement the tabularium peripherally, but no true dissepiment has been seen.

Remarks: *Sanidophyllum davidi* Etheridge (spelling of trivial name amended as directed by I.C.Z.N. Article 32(c)) normally has a much larger corallum with more widely spaced and commonly larger corallites, but it is a variable species and may approach the morphology of *S. etheredgei*. In this case the calical expansions, which generally develop a much more pronounced wall between the individual corallites in *S. etheridgei*, serve to distinguish the two species. *S. colligatum* Hill is a larger species with more numerous septa and a moderately well developed septal stereozone; it also has relatively less developed walls where adjacent calical expansions meet.



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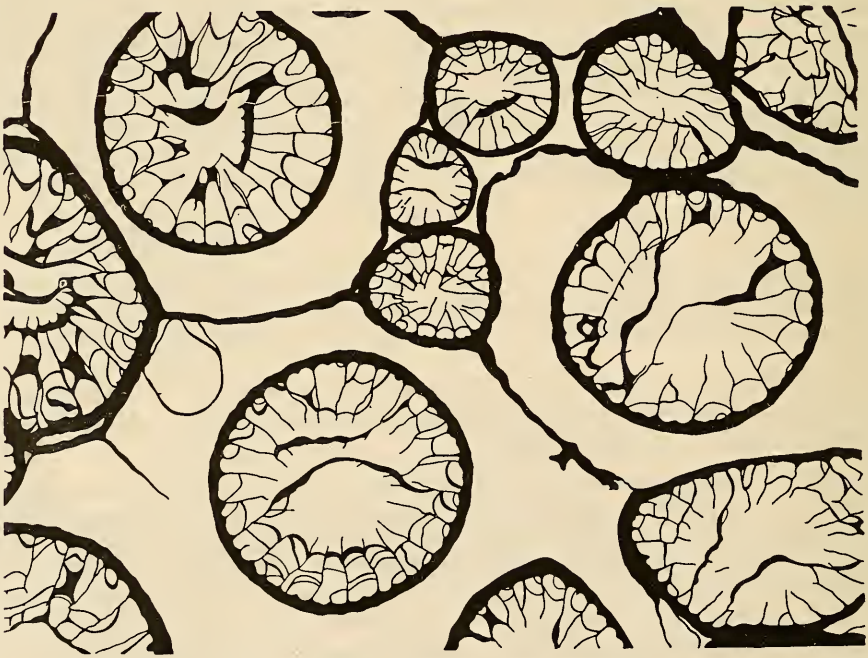

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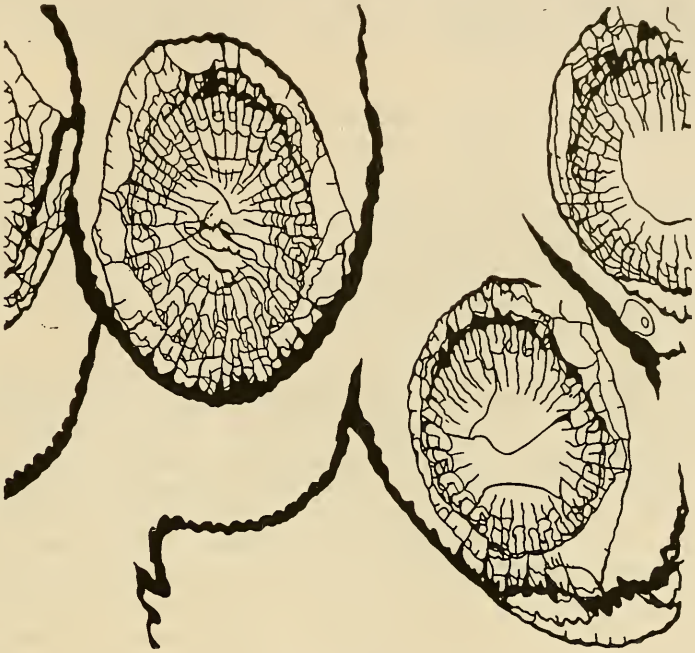
Figs 12, 13. *Sanidophyllum etheridgei* Pedder, sp. nov., × 2; holotype, UNE F10374, Timor Limestone (Givetian part), unit 5, section 5.

Genus Blysmatophyllum Pedder, nov.

Name derivation: Greek, βλυσμα = bubbling, and φυλλον = leaf.

Type species: *Blysmatophyllum isisense* Pedder, sp. nov., see below.

Diagnosis: Corallum sanidophylloid. Septa radially arranged with an endophylloid microstructure and commonly withdrawn from the periphery. Dissepimentarium well developed, normally extending on to the calical



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Figs 14, 15. *Blysmatophyllum isisense* Pedder, gen. et sp. nov., × 2; paratype 4, UNE F10389, Timor Limestone (Givetian part), UNE Locality 402.

expansions. Tabularium tending towards biseriate with a narrow outer series of flat to weakly concave tabellae and an inner series of peripherally downturned and peripherally elevated tabulae.

Remarks: The new genus is closely related to *Sanidophyllum* and *Endophyllum,* and also resembles *Iowaphyllum.* From the first it is distinguished by its well developed dissepimentarium and from the others by its sanidophylloid form. To some extent *Blysmatophyllum* is homeomorphic with the Silurian genus *Strombodes,* however they may be distinguished by their dissepimentaria which in *Strombodes* is periodically rejuvenated and is generally far less lonsdaleoid. At the present time the type species only is included in the genus.

BLYSMATOPHYLLUM ISISENSE Pedder, gen. et sp. nov.

(Pl. E, only Fig.; Pl. F, Fig. 1; Text-figs 14, 15)

Name derivation: Isis River, Upper Hunter Valley, New South Wales.

Type series: Holotype and paratypes 1, 2, UNE F10385–F10387 respectively, unit 5, section 5 (287 to 334 feet below the top of the Timor Limestone). Paratype 3, UNE F10388, Timor Limestone at UNE Locality 406. Paratype 4, UNE F10389, Timor Limestone at UNE Locality 402. Collected by A. E. H. Pedder. All are from the Givetian part of the limestone.

Diagnosis: Corallum large, sanidophylloid. Mature corallites 16 to 29 mm. in diameter and 5 to 26 mm. apart at levels between calical expansions. Septa radially arranged, well differentiated, zigzagly carinate in the dissepimentarium, commonly peripherally withdrawn, and numbering 28 × 2 to 31 × 2 in adult corallites; both orders represented by ridges on the upper surfaces of the calical expansions. Calical expansions usually markedly upturned peripherally. Tabularium endophylloid, biseriate to triseriate. Dissepiments elongate, commonly lonsdaleoid, in 1 to 4 rows and locally extending out on to the calical expansions.

Description: Except in very rare situations where there was inadequate space for the development of calical expansions the corallum is sanidophylloid. The largest known, which is paratype 4, was at least 70 cm in diameter and 40 cm. in height at the time of collecting. Unexpanded adult corallites of the holotype and paratypes 1 and 2 are mostly 23 to 25 mm. in diameter and 5 to 15 mm. apart, but in paratypes 3 and 4 they are generally only 16 to 18 mm. in diameter and 5 to 13 mm. apart. The largest corallite seen has a diameter of 29 mm. and the greatest distance observed between adjacent corallites is 26 mm. Calical expansions are given out every 7 to 20 mm., the typical interval being about 10 mm. In some cases rates of growth of adjacent corallites was markedly discrepant (see Text-fig. 15). The wall at unexpanded levels of the corallites is usually 0·3 to 0·4 mm. thick and consists of a thin axial plate and what appears to be lamellar skeletal tissue. The axial plate extends uninterruptedly over the lower surface of the calical expansions and is clearly visible between contiguous calical expansions. The septa are radially arranged, thin and in the unexpanded parts of the corallites well differentiated into two orders. They generally develop weak to moderate zigzag carinae in the dissepimentarium. Major septa may terminate as much as 5 mm. from the axis or they may be longer and even weakly rotated in the axial region. In some corallites lengthening and shortening of the septa was apparently periodic. Minor septa are commonly 0·5 to 3·0 mm. in length. Both orders of septa tend to be discontinuous towards the axis and withdrawn from the periphery. Major and minor septa are equally developed as low but distinct ridges on the upper surfaces of the calical expansions. Typically

the thickness of the calical expansions measured through the thickest part of one of these ridges is 0·8 to 1·0 mm. Calical expansions are upturned peripherally, producing a partition usually 3 to 7 mm. high, but in the absence of dissepiments it may be lower. The fine septal structure is not sufficiently preserved for detailed description, however slender rod-like trabeculae of the type seen in other endophyllids are visible in several of the thin sections. Various septal counts at diameters expressed in mm. are as follows:

30 (undiff.)	at 10·0	paratype 4	28 × 2	at 16·0	paratype 3
25 × 2	at 12·0	paratype 3	28 × 2	at 23·5	paratype 2
25 × 2	at 12·5	holotype	29 × 2	at 27·0	paratype 1
25 × 2	at 14·0	paratype 3	30 × 2	at 16·5	paratype 4
25 × 2	at 18·5	holotype	30 × 2	at 24·0	holotype
27 × 2	at 11·0	paratype 4	31 × 2	at 16·0	paratype 4
27 × 2	at 24·0	holotype	31 × 2	at 17·5	paratype 3

The dissepimentarium comprises large, elongate and commonly lonsdaleoid dissepiments arranged in 1 to 3, locally 4 rows; it may or may not extend on to the calical expansions. Sclerenchymal deposits may coat parts of the dissepimentarium. Generally the tabularium consists of a narrow outer zone of flat to gently concave tabellae and an inner broader zone of peripherally downturned tabulae. These tend to be elevated just inside the downward deflection and the elevation may be accentuated by vesicular tabellae so that in places the tabularium is tri- rather than biseriate. Some of the central tabulae flatten again beyond their downward deflection and then penetrate and form part of the outer flat zone.

Remarks: This is such a distinctive species that comparison with any other described to date would be superflous.

Measured Sections

As the upper contact of the Timor Limestone is generally better exposed and less diachronous than the lower contact we have numbered the lithologic units downwards.

Section 1

The section is located in a normally dry valley centered approximately one half mile south of "Allston" Homestead on the west side of the Isis River (Portions 99 and 81, Parish of Lincoln, County of Brisbane). Measurement begins between 0 and 27 feet below the top of the Timor Limestone and ends where the limestone passes beneath alluvium of the Isis River Valley. Section initially measured with tape and compass by A. E. H. Pedder and J. H. Jackson, April 1964, with subsequent revisions completed by J. H. Jackson and D. W. Ellenor, March 1968.

Unit No.	Thickness in feet: Unit	Total from top
1. Limestone, medium grey to black, fine to medium grained, dense, interbedded with irregular chert beds and nodules ranging from 1″ to 9″ in thickness and forming 15 to 30% of the total volume; thin to medium bedded. Megafossils sparse. *Polygnathus linguiformis* forma nova, *P. varcus*, *P.* (?) *variabilis*, *Spathognathodus brevis* and *S. planus* recovered from 20′ below the top of the unit.	60·9	60·9
2. Limestone and chert, as above but principally dark grey and very fine grained to microcrystalline	10·0	74·5
3. Limestone and chert as in unit 1. *Polygnathus varcus*, "*Endophyllum*" *schlueteri* and cystimorph tetracorals present	14·0	88·5

4.	Limestone, light to medium grey, fine grained, dense with dark, highly irregular chert lenses and nodules forming 30 to 40% of the total unit; thin to medium bedded. An abundant silicified fauna is present	43·5	132·0
5.	Limestone, essentially as above but no chert. *"Endophyllum" schlueteri* and digitate tabulate corals present	30·0	162·0
6.	Limestone, dark grey, fine to medium grained, dense; medium to massive bedded. Abundant pentamerid brachiopod fragments occur near the top of the unit. *Spathognathodus brevis* occurs 46′ from the top of the unit	62·9	224·9
7.	Limestone, light to medium grey, very fine grained to microcrystalline, small irregular light grey-brown chert nodules constitute approximately 10% of the unit; thin to medium bedded	30·0	254·9
8.	Limestone, light grey, cryptocrystalline, abundant ferruginous shale partings causing some brecciation, dense; medium bedded	40·2	295·1
9.	Limestone, essentially as above; poorly exposed	38·5	333·6
10.	Limestone, light to medium grey, fine grained, dense with a few shale stringers running randomly throughout; medium bedded. Some silicified fossils, including brachiopods	58·5	392·1
11.	Limestone, dark grey, fine to very fine grained, dense; medium bedded. Neither chert nor fossils evident	71·7	463·8
12.	Limestone, medium to dark grey, fine to very fine grained, non-biogenic, stylolitic with ferruginous material concentrated along the sutures, thin light grey chert lenses 1″ to 4″ total 8 to 10% of the unit's volume, dense; bedding thin to medium, well developed	36·5	500·3
13.	Limestone and chert, as above but chert content 15%. *Polygnathus kockelianus kockelianus*, *P. robusticostatus* (*s.l.*), *P. trigonicus* and *Spathognathodus bidentus bidentus* occur in lower 14′	27.0	527·3
14.	Limestone, light grey, fine to medium grained, some ferruginous staining along shale partings, light grey chert bands up to 4″ thick compromise 35% of the unit's volume, chert/limestone contacts very irregular, but are roughly parallel to the bedding, dense; bedding medium, well developed. *Polygnathus kockelianus kockelianus, and P. robusticostatus* (*s.l.*) from the top of unit. *Xystriphyllum* (?) *giganteum* approximately 30′ below the top	34·0	561·3
15.	Limestone and chert, as above but chert content 25% of the total rock	23·0	584·3
16.	Limestone and chert, as above but chert approximately 15–20% of the total rock	35·5	619·8
17.	Limestone as above but no chert present	23·0	642·8
18.	Limestone, essentially as above, but is profusely stylolitized resulting in apparent brecciation. A few corals are present including *Xystriphyllum* (?) *giganteum*, *Sociophyllum densum*, and *Sanidophyllum davidi*. *Polygnathus kockelianus kockelianus*, and *P. robusticostatus* (*s.l.*) occur 10′ below the top of the unit	19·0	661·8
19.	Limestone, light to medium grey, fine to very fine grained, heavily stylolitized, shale partings numerous, dense; thick to massive bedded	18·0	679·8
20.	Limestone, light grey, fine grained, essentially as above; medium bedded. *Polygnathus kockelianus kockelianus* and *P. robusticostatus* (*s.l.*) occur 8′ from the top of the unit	28·2	708·0
21.	Limestone, as above, some brecciated by stylolitization; medium to massive bedded. Corals include *Dendrostella* sp. cf. *D. rhenana* and *Sociophyllum densum*	64·5	772·5
22.	Limestone, light grey, microcrystalline, stylolitic, numerous red shale partings, concentrations on stylolite surfaces give rise to a red mottled appearance, irregular chert nodules and blebs constitute 20 and locally up to 40% of the total rock; massive bedded. Some corals present	57·5	830·0

23.	Limestone, light grey, fine grained, some chert, less than 5%, red argillaceous material coating stylolite faces; medium to thick bedded.	44·0	874·0
24.	Limestone, medium to dark grey, fine to medium grained, biogenic, siliceous argillaceous stringers (3″–5″ thick) running parallel to the bedding give the unit a characteristic "stepped" outcrop pattern; thin to medium bedded. *Icriodus corniger* occurs at the top of the unit	20·0	894·0
25.	Limestone, dark grey, fine to very fine grained, biogenic, siliceous argillaceous partings as above; thin bedded, lower part poorly exposed	87·5	981·5
	Total Timor Limestone exposed		981·5′

Section 2

The section is located on the western limb of the Timor Anticlinorium, one and one half miles north-west of "Allston" Homestead (Portion 78, Parish of Lincoln, County of Brisbane). The upper contact of the Timor Limestone is poorly exposed; the lower contact is well exposed and apparently disconformable above interbedded siliceous siltstones and mudstones of the Yarrimie Formation. Section initially measured with tape and compass by A. E. H. Pedder and J. H. Jackson, April 1964; subsequently revised by D. W. Ellenor, January 1968.

Unit No.		Thickness in feet Unit	Total from top
1.	Poorly exposed, limestone rare, chert main rock type visible, cream to deep red. Relict corals present	31·5	31·5
2.	Limestone, dark grey to black, fine to medium grained, slightly biogenic, small chert nodules, comprising less than 5% of the units volume, dense; upper 15′ poorly exposed, otherwise medium bedded. *"Endophyllum" schlueteri* present	89·7	121·2
3.	Limestone, medium to dark grey, fine to very fine grained, biogenic, dense; thin to medium bedded. Some silicified faunal debris	35·0	156·2
4.	Limestone, medium grey, medium to coarse grained, slightly biogenic; medium bedded. Rhynchonellid brachiopods present	9·0	165·2
5.	Limestone, medium grey, medium to coarse grained, sand size detrital quartz and lithic fragments common; poorly developed cross-bedding; thick to massive bedded	40·0	205·2
6.	Conglomerate, oligomictic with round chert pebbles (⅛″ to ½″ in diameter), matrix mainly lithic fragments, cement calcareous; thick bedded	6·5	211·7
	Total thickness of the Timor Limestone		211·7′

Section 3

The section is located on the western limb of the Timor Anticlinorium between section 2 and Ten Mile Creek, approximately one and three quarter miles north-west of "Allston" Homestead (Portion 78, Parish of Lincoln, County of Brisbane). The upper contact is not well exposed but appears conformable. The lowest unit of the section is in sharp contact with a rock unit interpreted as a slump breccia. Section initially measured by A. E. H. Pedder and J. H. Jackson, April 1964, and subsequently revised by D. W. Ellenor, January, 1968.

Unit No.		Thickness in feet Unit	Total from top
1.	Limestone, light to medium grey, very poorly exposed, black chert as large irregular masses comprises the bulk of the unit. Silicified corals, including *"Endophyllum" schlueteri* at the top, common	35·0	35·0

2. Limestone, light grey, medium grained, biogenic, irregular dark chert nodules abundant, dense; thin bedded poorly exposed	5·0	40·0
3. Limestone, medium to dark grey, fine to medium grained, biogenic, dense, small dark chert nodules forming less than 5% of the total rock, some ferruginous shale laminae interspersed throughout; thin to medium bedded. Some silicified tabulate corals. *Spathognathodus bipennatus*, and *S. brevis* collected 25′ from the top	46·2	86·2
4. Limestone, medium grey, fine grained, biogenic, dense, some very minor chert; medium bedded. Pentamerid brachiopods fragments common	54·1	140·3
5. Limestone, medium grey, fine grained, biogenic, dense; medium bedded. *Heliolites* sp., *Amaraphyllum amoenum*, and rhynchonellid brachiopods present 10′ to 26′ below the top	43·2	183·5
6. Limestone, medium grey-brown, medium to coarse grained; unit contains rounded biogenic detritus, subrounded sand size detrital quartz and some lithic fragments (detrital fragments constitute 40% of the total rock), interbeds 6″ to 10″ thick of non arenaceous limestone occur throughout; arenaceous units exhibit cross-bedding; medium bedded	7·0	190·5
7. Limestone, grey-green, medium to coarse grained; arenaceous with some rounded green and red chert fragments ($\frac{1}{2}$″–1$\frac{1}{2}$″ in diameter), coarse biogenic detritus; medium to thick bedded. *Heliolites* sp., and *Endophyllum* sp. present	20·5	211·0
8. Limestone, light grey, fine to medium grained; biogenic, interbedded within thin bedded calcareous arenite beds, containing rounded detrital quartz and lithic fragments, and some greenish chert pebbles up to 8″ in diameter.	22·0	233·0
Total thickness of the Timor Limestone		233·0′

Section 4

The section is located on a hill slope some 220 yards north-east of "Minto" Homestead (Portion 7, Parish of Lincoln, County of Brisbane). Fine grained lithic arenites and argillites of the Yarrimie Formation are moderately well exposed both immediately above and below the limestone. Section initially measured with tape and compass by A. E. H. Pedder and J. H. Jackson, April 1964, with revisions by D. W. Ellenor, January, 1968.

Unit No.	Thickness in feet Unit	Total from top
1. Limestone, light to medium grey, fine to medium grained, stylolitic with red argillaceous material concentrated along the sutures, biogenic, some siliceous faunal debris, small chert nodules comprising less than 5% of unit's volume; medium bedded. *"Endophyllum" schlueteri* abundant throughout	20·0	20·0
2. Limestone, light to medium grey, medium to coarse grained, coarsely and abundantly biogenic, characterized principally by large stromatoporoid and coral colonies, crinoidal debris very common; thin to medium bedded. *"Endophyllum" schlueteri* and *E.* sp. undet. are present	35·0	55·0
3. Limestone, light grey, fine to medium grained, sparsely biogenic, some ferruginous shale partings, dense; medium bedded	15·0	70·0
4. Limestone, grey white, medium to coarse grained, coarsely biogenic, abundant sand size detrital quartz grains and ferruginous shale stringers; medium bedded	5·0	75·0
5. Limestone, light grey, abundant stromatoporoids resting directly on underlying siltstones	2·0	77·0
Total thickness of the Timor Limestone		77·0′

Section 5

The section is located on the eastern limb of the Timor Anticlinorium, approximately one and three quarters miles east of "Allston" Homestead in the first main creek south of Perrys Creek (Portion 180, Parish of Crawney, County of Brisbane). Measurement starts at, or very close to, the upper contact of the Timor Limestone (overlying scree is exclusively of Yarrimie type argillites) and ends just east of a tightly folded zone within the limestone. Section measured with tape and compass by A. E. H. Pedder and J. H. Jackson, February, 1966; some revisions by D. W. Ellenor, January, 1968.

Unit No.		Thickness in feet Unit	Total from top
1.	Limestone, medium grey, fine grained, locally coarsely biogenic, dense; poorly bedded. Silicified fauna including "*Endophyllum*" *schlueteri*, *Mesophyllum* sp. and digitate tabulate corals. *Spathognathodus brevis* isolated from 10′ below top	104·1	104·1
2.	Limestone, light to medium grey, microcrystalline to coarse grained, biogenic, iron stained shale partings, dense; poorly bedded. Fauna which is silicified in upper part includes stromatoporoids, *Heliolites* sp. and massive tabulate corals	123·5	227·6
3.	Limestone, medium to dark grey, coarsely biogenic, dense; poorly bedded, ridge forming. Megafossils scarce but include *Heliolites* sp., a cystimorph tetracoral and rhynchonellids; *Endophyllum* sp. was collected *ex situ*	57·6	285·2
4.	Limestone, light grey, red tinted, coarse grained, dense *Endophyllum* sp. present	2·0	287·2
5.	Limestone, dark grey, fine grained, biogenic, dense; thin bedded. Rich coral fauna, partly silicified, including cf. *Placophyllum* sp. nov., *Dohmophyllum* sp., *Grypophyllum* sp. cf. *G. denckmanni*, *Stringophyllum quasinormale* var. *Amaraphyllum amoenum*, *Sanidophyllum etheridgei*, *Blysmatophyllum isisense*, *Plasmophyllum* sp. and *Calceola sandalina*	46·8	334·0
6.	Limestone, mostly dark grey, fine grained, biogenic; thin to medium bedded. Silicified tabulate corals present, other megafossils rare	57·9	391·9
7.	Limestone, medium to dark grey, fine grained, dense; massive, poorly bedded. No megafossils seen, but fossils rare	51·5	443·4
8.	Limestone, light to medium grey, fine grained, dense; massive, poorly bedded. No megafossils seen, but *Spathognathodus bipennatus* has been isolated from the top.	55·1	498·5
9.	Limestone, as above but some thin ferruginous shale partings; medium to thick bedded. *Bryantodus* sp. cf. *B. pravus*, *Polygnathus pseudofoliatus*, *Spathognathodus bipennatus* and *S. brevis* occur at the top	99·3	597·8
10.	Limestone, dark grey, fine grained with minor chert nodules and nodular bands; medium bedded	31·7	629·5
11.	Limestone, medium grey, coarse grained with coarse biogenic fragments, arenaceous, common brown weathered feldspathic fragments impart a speckled appearance to the rock	2·0	631·5
12.	Limestone, dark grey, fine grained, biogenic, dense, includes a 9″ medium to coarse grained limestone layer; medium bedded	22·4	653·9
13.	Limestone, medium to dark grey, fine to medium grained, biogenic, argillaceous stringers of dark chert forming 20 to 30% of the total rock; medium to thick bedded, lower part poorly exposed. Some silicified fossils. *Spathognathodus bipennatus* and *S. obliquus* 20′ from top; *P. kockelianus kockelianus*, *P. robusticostatus* (*s. l.*) *P. trigonicus* and *Spathognathodus bidentatus bidentatus*, occur throughout the lower 70′	92·1	746·0

14.	Limestone, medium grey, fine to medium grained, biogenic, dense, argillaceous stringers and chert occurring as bedded lenticles and lenses comprise from 20 to 30% of the total rock. *P. kockelianus kockelianus*, *P. robusticostatus* (*s. l.*), *P. trigonicus* and *Spathognathodus bidentatus bidentatus* occur at the top	59·4	805·4
15.	Limestone, light to medium grey, very fine grained, dense, thinly interbedded with argillaceous stringers and light grey chert, forming approximately 30% of the total rock; thin to medium bedded. *Polygnathus augustipennatus*, *P. kockelianus kockelianus*, *P. robusticostatus* (s. *l.*) *P. trigonicus* and *Spathognathodus bidentatus bidentatus* occur 5′ from the top	43·4	848·8
16.	Limestone, light to medium grey locally red stained, very fine to fine grained, dense, thin chert and argillaceous bands similar to those above; medium to thick bedded. *Polygnathus angustipennatus*, *P. kockelianus kockelianus*, *P. robusticostatus* (*s. l.*), *P. trigonicus* and *Spathognathodus bidentatus bidentatus* present	15·0	863·8
	Total thickness of Timor Limestone measured		863·8′

Section 6 (Type Section)

The section is located on the eastern limb of the Timor Anticlinorium and is centred approximately one and one half miles east-south-east of "Allston" Homestead; it extends from the north-eastern part of Portion 141 to the north-western part of Portion 142, Parish of Crawney, County of Brisbane. Yarrimie argillites outcrop poorly both immediately above and below the measured beds which thus constitute an almost complete section of the Timor Limestone. Section measured by A. E. H. Pedder and J. H. Jackson, June 1966.

Unit No.		Thickness in feet Unit	Total from top
1.	Limestone, dark grey, medium to coarse grained, argillaceous, stylolitic, dense; medium bedded. Abundant silicified fauna including *Stringophyllum* sp. cf. *S. isactis*, "*Endophyllum*" *schlueteri*, *Mesophyllum* sp., and an undetermined atrypid brachiopod	43·4	43·4
2.	Limestone, light grey, locally pink, coarse grained, biogenic, styolitic, dense; medium to massive bedded	39·8	83·2
3.	Limestone, light grey to pink, medium to coarse grained, biogenic with scattered detrital quartz grains and three 2′ to 3′ pentamerid coquina beds; medium to massive bedded	33·8	117·0
4.	Limestone, medium to dark grey, fine to medium grained, biogenic, dense; massive, cliff forming	18·1	135·1
5.	Limestone, as above but thin rubbly weathered. *Amaraphyllum amoenum* 3′ and 7′ from top, and *Spathognathodus brevis* at base	15·0	150·1
6.	Limestone, dark grey, in part very slightly argillaceous, fine to medium grained, biogenic, minor detrital quartz grains, dense; medium bedded	8·0	158·1
7.	Limestone, as above but rubbly weathered. *Heliolites* sp., *Dohmophyllum* sp., *Stringophyllum quasinormale* var., *S.* sp. nov., *Amaraphyllum amoenum*, *Sanidophyllum etheridgei*, cf. *Placophyllum* sp. nov., *Calceola sandalina*, *Spathognathodus bipennatus* and *S. brevis* present	62·5	222·6
8.	Limestone, as above but massive to rubbly weathered. Sparsely fossiliferous. *Polygnathus* sp. cf. *P. webbi* present	33·7	254·3
9.	Limestone, medium grey, microcrystalline to fine grained, biogenic, dense; thin, partly rubbly to medium bedded. Few silicified fossils	37·9	292·2

10.	Limestone, medium grey, fine to medium grained, biogenic, dense; medium bedded except for one 5′ massive bed 23′ to 28′ above base. Few stromatoporoids and corals; *Polygnathus ciflius, P. varcus, Spathognathodus bipennatus* and *S. brevis* 28′ from top; *P. robusticostatus* (*s. l.*) at base	56·4	348·6
11.	Limestone, medium grey, fine to coarse grained, biogenic, dense; medium bedded but poorly exposed. Few silicified stromatoporoids and corals; *Polygnathus ciflius* at top; *Ozarkodina kutscheri, P. angustipennatus, P. eiflius, P. kockelianus kockelianus, P. robusticostatus* (*s. l.*), *P. trigonicus, Spathognathodus bidentatus bidentatus* and *S. bipennatus* at base	31·6	380·2
12.	Covered interval, evidently over cherty beds	36·0	416·2
13.	Limestone, dark grey, fine grained, biogenic, thinly interbedded with an approximately equal amount of dark grey chert. Comparatively rare silicified corals and brachiopods present throughout; *Polygnathus angustipennatus, P. kockelianus kockelianus, P. robusticostatus* (*s. l.*), *P. trigonicus, Spathognathodus bidentatus bidentatus* and *S. bipennatus* at top	25·7	441·9
14.	Limestone and chert, as above but chert approximately 30% of total rock. Some silicified atrypids throughout; *Ozarkodina kutscheri, Polygnathus eiflius, P. kockelianus kockelianus, P. robusticostatus*, (*s. l.*), *P. trigonicus, Spathognathodus bidentatus bidentatus* 70′ from top; *Lonchodina ramulata, Polygnathus kockelianus kockelianus P. robusticostatus* (*s. l.*), *P. trigonicus, Spathognathodus bidentatus bidentatus* 118′ from top; *Polygnathus kockelianus kockelianus* at base	163·2	605·1
15.	Limestone and chert, as above but chert approximately 60% of total rock. *Polygnathus angusticostatus, P. angustipennatus, P. kockelianus kockelianus, P. trigonicus, Spathognathodus bidentatus bidentatus, S. bidentatus transitans* and *S. obliquus* at base	45·8	650·9
16.	Limestone and chert, as above but chert approximately 40% of total rock. *Polygnathus eiflius, P. kockelianus kockelianus, P. robusticostatus* (*s. l*), *P. trigonicus, P.* sp. cf. *P. hulkus* and *Spathognathodus bidentatus transitans* 48′ from top	84·8	735·7
	Traverse of about 250 yards here.		
17.	Limestone, fawn, light grey to maroon, mostly crypto- to microcrystalline, highly stylolitic, dense; massive. *Dendrostella* sp. cf. *D. rhenana, Xystriphyllum* (?) *giganteum, Sociophyllum densum, Sanidophyllum colligatum* and *S. davidi* present at certain levels; *Polygnathus angustipennatus, P. kockelianus australis P. robusticostatus* (*s. l.*) and *P.* sp. cf. *P. trigonicus* 126′ from top	164·1	899·8
18.	Limestone, white to light grey, rose tinted, dense, argillaceous and up to 35% chert and jasper, stylolitic; medium bedded. Rare silicified corals; *Polygnathus angustipennatus, P. kockelianus australis, P. kockelianus* subsp. cf. *P. kockelianus australis, P.* cf. sp. *P. pseudofoliatus P. robusticostatus* (*s. l.*) and *Spathognathodus bidentatus bidentatus* 44′ from top	49·6	949·4
19.	Limestone, white to light grey or pink, coarsely crystalline, dense with approximately 5% chert; medium to thick bedded. No megafossils observed, but *Polygnathus robusticostatus* (*s. l.*) occurs at the base	26·2	975·6
20.	Limestone, siliceous, poorly exposed, rubbly, weathered, thin bedded where exposed	47·1	1022·7
21.	Limestone, medium to dark grey, microcrystalline to coarse grained, biogenic thinly interbedded with cherty bands forming approximately 35% of the total rock; thin bedded, poorly exposed	12·0	1034·7
22.	Limestone, as above but argillaceous and interbedded with chert forming 30% of the total rock. *Haplistian robustum, Favosites* sp. and *Stringophyllum* sp. nov. are present	54·1	1088·8

23.	Limestone, dark grey, microcrystalline to very fine grained, argillaceous, dense, thinly interbedded with an approximately equal amount of dark chert; ochrous weathered, poorly exposed. *Columellaespongia woolomelensis* and silicified corals, including *Stringophyllum* sp. nov., *Calceola sandalina* and *Plasmophyllum* sp.; *Polygnathus* sp. cf. *P. pseudofoliatus* 44′ from top; *Icriodus corniger* occurs throughout	61·2	1150·0
	Total Timor Limestone exposed		1150·0′

Section 7

The section is located in a normally dry valley centred about one quarter mile north-west of "Allston" Homestead on the western side of the Isis River(Portions 14 and 80, Parish of Lincoln, County of Brisbane). Contact with the overlying Yarrimie argillites is sharp and apparently conformable; the section ends on the bank of the Isis River but there is a covered interval of approximately 35 stratigraphic feet between the base of the section and the underlying arenites and siltstones of the Yarrimie Formation. Section measured with tape and compass by A. E. H. Pedder, J. H. Jackson and D. W. Ellenor, June and July 1967.

Unit No.		Thickness in feet Unit	Total from top
1.	Limestone, light grey, coarse grained, biogenic; thin to medium bedded	9·0	9·0
2.	Limestone, medium grey, fine grained, dense; dark chert nodules constitute about 30% of the total rock; thin to medium bedded, poorly exposed in lower part. *Polygnathus linguiformis* forma nova, *P. varcus*, *P.* (?) *variabilis* at top; *Polygnathus linguiformis* forma nova, *P. pseudofoliatus*, *P. varcus* and *Spathognathodus brevis* 20′ from top; *Polygnathus linguiformis linguiformis* and *Spathognathodus brevis* at base	44·1	53·1
3.	Dolerite, altered; green weathered	1·0	54·1
4.	Covered interval	5·4	59·5
5.	Limestone, medium to dark grey, fine grained, dense; dark thin bedded chert forming 20 to 40% of the total rock; thin bedded. Fauna, including tabulate corals and brachiopods, partly silicified. *Polygnathus linguiformis* forma nova and *Spathognathodus brevis* at top; *Ancyrognathus walliseri*, *Polygnathus linguiformis linguiformis* and *P. linguiformis* forma nova 20′ from top	50·8	110·3
6.	Limestone, medium grey, finely biogenic, dense; medium to massive bedded. "*Endophyllum*" *schlueteri* and a large pentamerid brachiopod occur throughout; *Polygnathus varcus* occurs at top	42·7	153·0
7.	Limestone, as above but mostly medium bedded	31·7	184·7
8.	Limestone, dark grey, fine to medium grained, biogenic; mostly medium bedded. Fauna, including "*Endophyllum*" *schulieteri* and a pentamerid brachiopod, partly silicified; *Polygnathus varcus* and *Spathognathodus brevis* present near top	13·9	198·6
9.	Limestone, light grey, cryptocrystalline, dense; massive poorly bedded with some ferruginous staining. *Polygnathus eiflius*, *P. robusticostatus* (*s. l.*) and *Spathognathodus bidentatus bidentatus* occur near middle of unit	37·0	235·6
10.	Limestone, medium to dark grey, crypto- to microcrystalline, dense; massive. Poorly fossiliferous, *Polygnathus trigonicus* and *Spathognathodus bidentatus bidentatus* occur at top	12·0	247·6
11.	Limestone, as above but with chert nodules forming 3 to 5% of the total rock	28·5	276·1

12.	Limestone, light to dark grey, crypto- to microcrystalline, dense, light coloured chert nodules forming 10 to 15% of the total rock; massive. *Polygnathus kockelianus kockelianus* and *P. robusticostatus* (*s. l.*) 5′ from top	34·0	310.1
13.	Limestone, medium grey, microcrystalline, dense; thin to medium bedded; light coloured chert nodules forming 10 to 15% of the total rock. *Spathognathodus bidentatus bidentatus* occur at top	40·1	350·2
14.	Limestone, medium grey, very fine grained, dense; scattered chert nodules forming less than 5% of total rock; poorly bedded. *Polygnathus kockelianus kockelianus* at top	40·8	391·0
15.	Limestone, light grey, mostly medium grained, dense; chert nodules less than 3% of the total rock; poorly bedded	32·2	423·2
16.	Limestone, as above but mostly finely crystalline. *Polygnathus kockelianus kockelianus, P. robusticostatus* (*s. l.*) *Spathognathodus bidentatus bidentatus* and *S. bidentatus transitans* occur at top	35·3	458·5
17.	Limestone, light grey, fine to medium grained, dense, sporadic chert pods and lenses; medium to thick bedded, some iron staining. *Sanidophyllum colligatum* and *S. davidi* at base; *Polygnathus robusticostatus* (*s. l.*) at top ..	17·4	475·9
18.	Limestone, light grey, microcrystalline, dense, minor chert stringers; poorly medium bedded, grey-brown mottled weathering. *Polygnathus kockelianus kockelianus* and *P. robusticostatus* (*s. l.*) at top	17·6	493·5
19.	Limestone, light grey, crypto- to microcrystalline, dense; poorly bedded, red iron staining along stylolitic faces. *Polygnathus kockelianus kockelianus, P. robusticostatus* (*s. l.*) and *P. trigonicus* occur at top	72·4	565·9
20.	Limestone, medium grey to brown, crypto- to microcrystalline; medium to thick bedded, red iron staining along stylolitic faces	41·4	607·3
21.	Limestone, as above but partly brecciated and thin bedded towards the base	15·0	622·3
22.	Limestone, light grey, crypto- to microcrystalline in 2′ to 3·5′ bands alternating with 2″ to 6″ bands of chert; partly brecciated; iron stained and rubbly weathered. *Polygnathus robusticostatus* (*s. l.*) at top	32·8	655·1
23.	Limestone, reddish grey, very fine grained, interbedded with 1″ to 3″ chert layers forming approximately 10% of the total rock; iron staining along stylolites; rubbly to blocky weathered. *Polygnathus kockelianus* subsp. cf. *P. kockelianus australis* and *P.* sp. cf. *P. trigonicus* are present	19·7	674·8
24.	Limestone, grey to brown with red tint, cryptocrystalline to very fine grained, interbedded with 1″ to 3″ cherty layers forming approximately 10% of the total rock; iron staining along stylolites, medium to thick bedded; rubbly to blocky weathered	10·0	684·8
25.	Limestone, as above but chert in distinct 2″ to 6″ beds forming 25% of the total rock	31·1	715·9
26.	Limestone, grey to brown, medium to coarse clastic; thick to massive bedded; rubbly to blocky weathered. *Polygnathus kockelianus australis* at top	29·6	745·5
27.	Limestone, as above but with nodules and stringers of chert forming 15 to 20% of the total rock. *Polygnathus linguiformis linguiformis* and *P. webbi* at top	3·0	748·5
28.	Limestone, light to medium grey, medium to coarse clastic with chert as above; thin bedded. *Icriodus nodosus, I.* sp. nov. and *Spathognathodus obliquus* present	17·3	765·8
29.	Limestone, medium to dark grey, medium grained, crinoidal, with chert as above; thin to medium bedded ..	20·0	785·8
30.	Limestone, argillaceous, medium to dark grey, cryptocrystalline to fine grained, abundant stringers of chert forming 25 to 30% of the total rock; thin rubbly recessive weathering	35·8	821·6

31.	Limestone, argillaceous, dark grey to black, fine grained, rhythmically interbedded, typically every 6″ to 8″ with irregular lenticular chert bands, usually 1″ to 4″ thick, chert comprises 30 to 40% of the total rock; top part exposed in road cut, lower beds rubbly weathered. *Isispongia paradoxa, Calceola sandalina, Icriodus corniger, Polygnathus webbi* and *Polygnathus linguiformis linguiformis* are present	65·6	887·2
	Total Timor Limestone exposed, including 1′ to 6·4′ of dolerite		887·2′

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PLATE XX

Figs 1, 2. *Grypophyllum* sp. cf. *G. denckmanni* Wittekindt, × 2; UNE F10414, Timor Limestone (Givetian part), unit 5, section 5.

Fig. 3. *Sanidophyllum etheridgei* Pedder, sp. nov., × 2; holotype, UNE F10374, Timor Limestone (Givetian part), unit 5, section 5.

PLATE XXI

Figs 1, 2. *Sanidophyllum colligatum* (Etheridge), × 2; UNE F10372, Timor Limestone (late Eifelian part), base of unit 17, section 7.

PLATE XXII

Figs 1, 2. *Sanidophyllum davidi* (Etheridge), × 2; UNE F10371, Timor Limestone (late Eifelian part), base of unit 17, section 7.

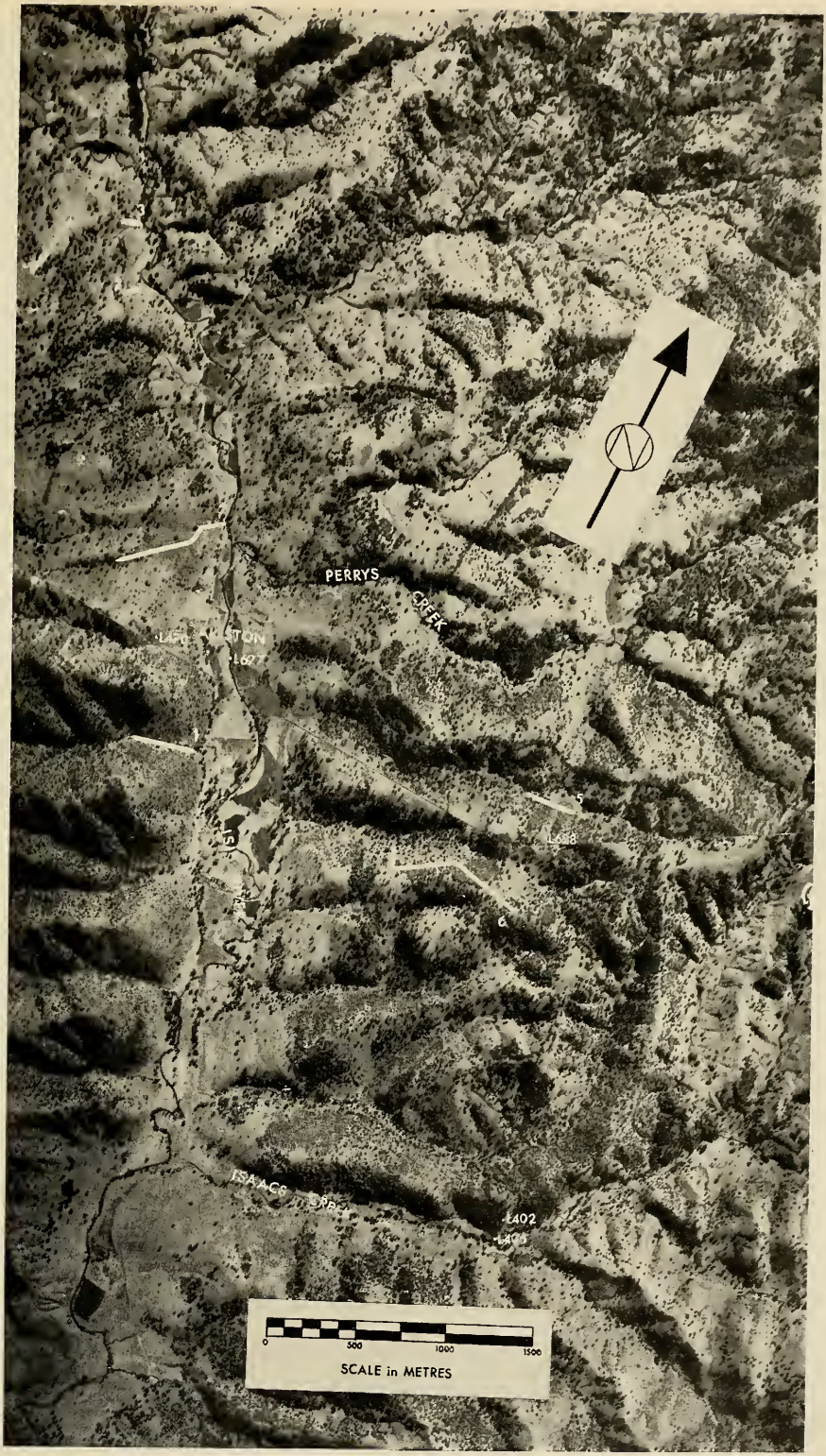
PLATE XXIII

Figs 1, 2. *Xystriphyllum* (?) *giganteum* (Etheridge), × 2; 1, UNE F10415, unit 18, section 1; 2, UNE F10416, 30 feet below the top of unit 14, section 1.

Figs 3–5. *Dendrostella* sp. cf. *D. rhenana* of Hill 1942*b*, × 3; UNE F10368, Timor Limestone (late Eifelian part), UNE Locality 627.

PLATE XXIV

Figs 1–3. *Sociophyllum densum* (Hill), × 3; UNE F10360, Timor Limestone (late Eifelian part), UNE Locality 627.


PERRYS
CREEK
L627
L488
L402
ISAACS
0
500
1000
1500
SCALE in METRES